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## MEDICAL NEWS LETTER

Vol. 41

Friday, 15 March 1963

No. 6

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md., giving full name, rank, corps, and old and new addresses.

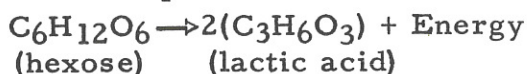
The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.



Lactic Acidosis

Leading Article, The Lancet, No. 7273, Vol. 1 for 1963, 147-148.

Anyone wanting to epitomize the birth and growth of modern biochemistry could do no better than to quote the equation of anaerobic glucolysis:



Pasteur showed that in a glucose-containing medium yeast cells, even though deprived of oxygen, would flourish, multiply, and generate acid; and extracts made from such cells led him to the momentous discovery of enzymatic catalysis. Today the intermediate esters of fermentation have become eponymous landmarks; and, while yeast remains enshrined in *en-zymē*, the process is recognized as a metabolic path common to all living creatures except green plants, viruses, and some bacteria. In cells which cannot assimilate molecular oxygen the transformation conforms to Pasteur's original equation and yields lactic acid. In aerobic systems—whether single cells, tissues, or complex organisms functioning as aerobic units—pyruvate is usually represented as the chief product. Several important metabolic pathways converge on this highly reactive ketoacid. In anaerobic glucolysis it is the immediate precursor of lactic acid: by other enzymatic routes it links up with protein and purine metabolism; and through the key reaction sequence of decarboxylation it provides the bulk of activated two-carbon fragments for the common mill of aerobic metabolism—the tricarboxylic-acid cycle. When its many connections are shown diagrammatically, lactic acid generally occupies the blind end of a metabolic cul-de-sac. The two acids—pyruvic and lactic—are poised in dynamic equilibrium by the enzyme lactic-acid-dehydrogenase (which couples their interconversion with the oxidation/reduction of diphospho-pyridine-nucleotide); but in more comprehensive metabolic flow-schemes pyruvic acid appears as both the main source and the first degradation product of lactic acid. Applied to clinical chemistry this picture is the basis for interpreting lactic-acid concentrations as an indirect parameter of pyruvate metabolism; and it is one reason why little effort is usually made to establish blood-lactate estimation as a routine procedure. (The other reasons are technical, and their validity is fast disappearing.) But perhaps Nature, reputed to abhor a vacuum, has a residual dislike for blind alleys.

Two years ago Huckabee described a new syndrome, lactic acidosis, and suggested that "excess lactate" distinguished this from other conditions in which slight to moderate rise in blood-lactate may be a secondary or incidental feature. The fact that it took 6 years to collect nine cases might suggest that the syndrome is rare; but awareness and more general use of new diagnostic techniques will probably disprove this. The picture which emerges from his series is that of a biochemical rather than of a clinical entity. All Huckabee's patients were already in hospital, but with a variety of illnesses and undergoing different forms of treatment. Perhaps their only common clinical denominator was



that most of them were recovering, and some were on the point of being discharged, when tachypnea and dyspnea gave the first hint of impending metabolic acidosis. (Three of the patients were still in mechanical respirators after bulbar poliomyelitis and therefore developed no respiratory manifestations.) No new abnormal physical signs developed to provide a clue to the etiology; and all forms of poisoning, including drug intoxication, could be excluded. Despite vigorous treatment with alkalis, the illness rapidly progressed to stupor, coma, and death.

The first laboratory finding to point to the underlying metabolic abnormality was an unexplained discrepancy between the plasma-chloride and the plasma-cation concentrations. On further investigation the "missing" anion was identified as lactate; and its concentration was measured by various methods. These measurements revealed a progressive lactic-acidemia of extraordinary severity. Serum-lactate levels rose to 25 mEq. per litre—not only high above the upper limit of normal (wide though the range of physiological variations is) but also considerably higher than the values obtained in experimental studies by a combination of strenuous exercise, hypoxia, and carbohydrate loading. Technical errors were excluded by multiple estimations both on arterial and on venous samples collected under as nearly basal conditions as possible. The blood-pH, moreover, declined in direct proportion to the rise in blood-lactate: in one case it fell below 7 in the terminal phase. Where did all this lactic acid come from? Of several inspired guesses none could convincingly account for the complete biochemical picture. Within the framework of current metabolic thinking one finding was particularly difficult to explain: while the serum-pyruvate level was raised in most patients (and very high in some), the rise was not nearly proportional to the increase in serum-lactate. Huckabee expressed this in terms of excess lactate—a useful if somewhat artificial index calculated from the actual and the "expected" serum-lactate/serum-pyruvate ratios. Nor was there any evidence to suggest a primary disturbance of carbohydrate metabolism, thiamine deficiency, or a block in the tricarboxylic-acid cycle. Since physiological lactic-acidosis is most commonly caused by skeletal muscles working over short periods on an oxygen debt, both oxygen transport and peripheral oxygen uptake were investigated in detail. Neither could be proved to be at fault. (Such measurements can only approximately indicate how freely oxygen is available inside the cells; and many enzymatic processes, including pyruvate oxidation, can be inhibited by a slight sustained increase in oxygen tension as well as by oxygen deprivation.) The wide, even hectic, fluctuations in serum-bicarbonate levels are a reminder that both in extreme acidosis and in extreme alkalosis this investigation is an unreliable guide to the acid-base imbalance. With so much essentially negative evidence it is hard to accept the tentative conclusion that the syndrome is caused by widespread tissue hypoxia. Rather, perhaps, lactic acid should be credited with more diverse metabolic roles in the normal organism than has been done hitherto. Under what physiological circumstances, for example, does it undergo dehydration to methyl-glyoxyl rather than dehydrogenation to pyruvate; and to what metabolic regions could such a reaction lead?

All nine patients in Huckabee's original series died; but the syndrome has since been recognized in milder and episodic forms. That acidosis in diabetics



is not always due to ketosis or to coincident renal failure is not a new notion: Lexow in particular raised the possibility that in some cases the  $H^+$ -ion donor might be lactic acid. This has now been confirmed in three cases, all of which were diagnosed and investigated by a group of American workers within the relatively short period of 9 months. The origin of the excess lactate remained as mysterious in these cases as in Huckabee's: neither the diabetes nor antidiabetic drugs could be directly incriminated. All three patients responded to large doses of bicarbonate, though recovery was delayed in one by alcohol.

Possibly these reports will strike a reminiscent chord in many minds. The diabetic series oddly recalls the biochemical changes often found in patients under hypothermia. But at a more mundane level serum-electrolyte and related biochemical results which do not "add up" are not rare: they are difficult to explain; and, indeed, they usually remain unexplained. Isolated in the laboratory, the pathologist is in no position to try to fit them together; and, reluctant to venture beyond the ward, the clinician dismisses them as artefacts. The correct diagnosis requires the cooperation of the two.

\* \* \* \* \*

#### Coccidioidomycosis - A Traveling Fungus Disease \*

E. Richard Harrell MD and W. Mage Honeycutt MD, Ann Arbor, Mich.  
Arch Derm 87: 188-196, February 1963.

Coccidioidomycosis is a systemic fungus disease that is normally acquired within a geographic area including the southwestern United States and adjacent parts of Mexico. A recent study of Maddy, Crecelius, and Cornell indicates that the areas of the United States in which coccidioidomycosis is endemic correspond identically with the climatic zone known as the Lower Sonoran Life Zone. This zone is defined by its high mean January and July temperatures and an annual rainfall of 5 to 20 inches. A map reveals that it corresponds almost exactly with those areas of California, Nevada, Arizona, Utah, New Mexico, and Texas that have long been considered to be the ones in which coccidioidomycosis is endemic. It is only natural that the great majority of published reports concerning the disease have come from known endemic areas. It receives diagnostic consideration with regularity from physicians within these regions; however, little or no thought is given to this protean mycotic infection by physicians who reside in areas distant from those in which the disease is acquired.

Coccidioides immitis is probably the most infectious of all fungi capable of producing serious systemic disease. There is a definite possibility that human infection may develop from very short residence in, or even travel through, the endemic areas of the Southwest. Also, these areas are becoming increasingly

\* From the Department of Dermatology, University of Michigan Medical Center. Read before the 82nd Annual Meeting of the American Dermatological Association, Inc., Chandler, Ariz., March 30, 1962.



popular as resort and vacation sites for much of the populace of the United States. An estimated two and half million people each year visit the National Forests and Parks of the eastern edge of the San Joaquin Valley of California. It seems likely that an increasing number of human infections with *Coccidioides immitis* will develop. It is the purpose of this report to illustrate that coccidioidomycosis must be given diagnostic consideration by physicians throughout the entire United States. The authors present 12 case reports, all seen at the University Hospital in Ann Arbor, Mich., and originally diagnosed either in this hospital or others nearby. They serve to illustrate the unpredictable clinical course taken by this mycotic infection.

TABLE 1.—Summary of 12 Cases of Coccidioidomycosis

Case	Age, Sex, Race	Presumed Area Disease Acquired	Coccidioidin Skin Test React./Dilut.	C-F Antibody Titer	Disease Manifestation	Treatment	Outcome
1	18, M, W	Ariz.	4+1:1000	Neg.	Primary cutaneous	None	Cured
2	38, F, W	N. M.	Neg. 1:10	1:4	Residual lung cavity	Resection	Cured
3	28, M, Mex.	Texas	2+1:100	Not done	Residual lung cavity	None	Unknown
4	25, M, W	S.W. U. S.	2+1:1,000	Not done	Residual lung cavity	Phrenic crush	Unknown
5	36, M, W	Nev.	3+1:1,000	Not done	Residual lung cavity	Resection	Cured
6	44, F, W	S.W. U. S.	Neg.	Neg.	Residual lung cavity	Resection	Cured
7	38, F, W	Ariz. Calif.	Neg. 1:10	1:16	Residual lung cavity	Resection	Unknown
8	25, M, W	Ariz.	Neg. 1:100	1:4	Residual lung cavity	Resection amphotericin B	Improved
9	26, F, W	Texas	3+1:1,000	Not done	Residual lung granuloma	Resection	Cured
10	48, F, W	Calif.	Neg. 1:100	Neg.	Residual lung granuloma	Resection	Cured
11	60, M, Mex.	Texas	Neg. 1:10	1:8	Disseminated	None	Fatal
12	30, M, W	Calif.	1+1:100	1:16	Disseminated (isolated granuloma)	Excision amphotericin B	Cured

It is quite probable that all of the 12 patients with coccidioidomycosis initially acquired the disease in an established endemic area of the United States as set out in Table 1. Nevertheless, they presented themselves as diagnostic problems to physicians in southeastern Michigan, an area quite remote from the Lower Sonoran Life Zone; thus the diagnosis of coccidioidomycosis was first established in the Midwest rather than in the southwestern United States. It is probable that a much larger series of patients with this fungus disease could be assembled by searching the records of nearby hospitals in addition to the University Hospital; however, no effort was made to do this. It seems quite possible that coccidioidomycosis may be a common systemic fungus disease, not only in the endemic zone, but in all areas of the United States. Furthermore, it seems probable that with the present increase of travel through the endemic area, the incidence of the disease will increase throughout this country and, in fact, all areas of the world in which travel is freely permitted. In view of the climatic characteristics of the Lower Sonoran Life Zone, it does not seem likely that new endemic areas of coccidioidomycosis will develop.

Case 1 undoubtedly represents an example of primary cutaneous coccidioidomycosis. This rare type of inoculation disease has been previously documented by Wilson, Smith, and Plunkett. One other case of this form of the disease resulting from the prick of a thorn has been reported. Case 1 fulfills the criteria



for diagnosis of primary cutaneous coccidioidomycosis proposed by Wilson, Smith, and Plunkett, with the exception that the authors' patient did not have serologic studies performed during the entire course of the disease. The lack of such complete data in this case and others in this study is attributable to the fact that the responsible physicians were unfamiliar with the nature of the disease process.

Nine of the twelve patients reported in this series were found to have benign residual pulmonary involvement secondary to the development of primary pulmonary coccidioidomycosis. Cases 2 through 8 had residual coccidioidal cavitation with varying degrees of symptomatology secondary to the cavitory lesion. All of these 7 patients presented the classic roentgenographic finding of a thin-walled cavity which is almost pathognomonic of coccidioidomycosis. Unfortunately, this characteristic finding is not well recognized by roentgenologists in

TABLE 2.—Time Lapse Between Presumed Onset and Correct Identification of Disease

Case	Interval	Manifestation
1	4 mo.	Primary inoculation
2	3 yr.	Residual pulmonary cavity
3	2 ½ yr.	Residual pulmonary cavity
4	2 yr.	Residual pulmonary cavity
5	4 yr.	Residual pulmonary cavity
6	3 yr.	Residual pulmonary cavity
7	7 yr.	Residual pulmonary cavity
8	3 yr.	Residual pulmonary cavity
9	2 yr.	Residual pulmonary coccidioidoma
10	3 yr.	Residual pulmonary coccidioidoma
11	2 yr.	Disseminated coccidioidomycosis
12	7 mo.	Disseminated coccidioidomycosis

TABLE 3.—Time Lapse Between Presumed Onset of Disease and Development of Symptoms

Case	Interval	Manifestation
1	Wks.	Primary inoculation
2	1 yr.	Residual pulmonary cavity
3	2 ½ yr.	Residual pulmonary cavity
4	2 yr.	Residual pulmonary cavity
5	Wks.	Residual pulmonary cavity
6	Wks.	Residual pulmonary cavity
7	Less than 1 yr.	Residual pulmonary cavity
8	Wks.	Residual pulmonary cavity
9	Asymptomatic	Residual pulmonary coccidioidoma
10	Asymptomatic	Residual pulmonary coccidioidoma
11	2 yr.	Disseminated coccidioidomycosis
12	6-7 mo.	Disseminated coccidioidomycosis

the Midwest, because the correct diagnosis was not suggested in the X-ray reports of any of these 7 patients. The true etiology of the pulmonary cavitation was established by isolation of *C. immitis* from the sputum in Cases 3 through 8 and by culture of the surgical specimen in Case 2. The rather astonishing length of time between the presumed time of acquisition of this mycotic infection and the correct identification of the disease is summarized in Table 2. This time lapse varied from 4 months in Case 1 to 7 years in Case 7. The latter case emphasizes the mistakes that are so typically made in identifying this infection. The patient had had pulmonary symptoms for the entire 7-year period to the establishing of the correct diagnosis. The causative organism was overlooked by the pathologist in his examination of material obtained at the time of the lung resection. Also the negative coccidioidin skin test was misinterpreted, as it was in several of these cases, since it was thought to indicate that the patient did not have the disease. The significance of negative skin tests in forms of the disease other than primary coccidioidomycosis and the necessity of correlating the skin test reaction with complement fixing antibody levels are points which are poorly appreciated by the majority of physicians practicing outside endemic regions. The correlation of these two



studies was not performed in all of the 12 cases in this series. However, such interpretation in Cases 1 and 8 indicated the possibility that these 2 patients might have developed a more disseminated form of coccidioidomycosis. Case 11, a fatal case of disseminated coccidioidomycosis, exhibited the expected immunologic pattern of a negative coccidioidin skin test and positive complement fixing antibody titer. In this regard, Case 12 was also of interest in that careful correlation of the skin test and the complement fixation antibody titer indicated probable further dissemination of the disease process and prompted the institution of amphotericin B therapy.

Cases 9 and 10 demonstrated benign residual pulmonary coccidioidal lesions in the form of a solitary granuloma (coccidioidoma). Both of these patients had asymptomatic disease and were diagnosed after routine X-ray examination of the chest revealed a solitary nodular lesion. A time lapse of 2 and 3 years, respectively, existed between the presumed acquisition of the disease and the finding of *C. immitis* in the granulomatous tissue removed at operation as shown in Table 2. This type of benign pulmonary granuloma was described by Dickson in 1915 and was considered part of the disease prior to the present conception of primary pulmonary coccidioidomycosis. Winn has written that such solid lesions may occur as "filling of a residual cavity." The lesions may also undergo central necrosis and become cavitory in character.

A third table emphasizes the sometimes unappreciated fact that a considerable interval may occur between the inhalation of the fungus and development of actual symptomatic disease. Case 11 illustrates this point quite graphically. This patient lived in Michigan for 2 full years prior to the first indication of a symptomatic infection. He then developed progressive disseminated coccidioidomycosis which terminated fatally. Two other patients (Cases 3 and 4) also had a time lapse of 2 or more years between the acquisition of the disease and the development of symptoms.

Ten of the twelve patients were diagnosed prior to the introduction of amphotericin B therapy. This drug was used in 2 patients (Cases 8 and 12) with apparent success.

## Discussion

Dr. Donald M. Pillsbury, Philadelphia: "I think you might wonder why someone from the Philadelphia area would dare to talk about coccidioidomycosis, but my initial experience with this disease was when I was interning in Omaha, Neb., in 1927. At that time, Dr. Fred Weidman's laboratory in Pennsylvania (and all similar laboratories where *C. immitis* was being cultured) was serving as a fairly good endemic focus for this disease, and we had a medical student who had spent a summer in Dr. Weidman's laboratory and who, about a year and a half later, developed a large granulomatous lesion on his leg. He was otherwise well. I vividly recall the discussion as to whether he should undergo amputation. That was, fortunately, not carried out. I gave this patient many injections of antimony potassium tartrate, U. S. P., to no avail. Eventually he recovered entirely. This was a factor in exciting my interest in dermatology because there were so many intriguing factors in this infection.



I saw only an occasional case thereafter, several of them acquired in laboratories, until the war years. I think that Dr. Harrell's feeling that we may see more of these as the population explodes in the endemic areas, and more patients with the disease in other parts of the world, is well borne out by our war experience which, I am sure, is familiar to many.

A large number of troops, particularly armored divisions, trained in this area, and I soon began to see coccidioidomycosis in many European Army hospitals. I do not know what the total number was, but it became something of an occupational disease as far as I was concerned, and I would prick up my ears if I encountered a patient with a granulomatous skin lesion or obscure systemic infection who was from an armored division. I am sure the figures on this will be published in due course—if they have not already been—because it was a fascinating epidemiologic microbiologic phenomenon during the war.

The Armed Forces are still very much aware of this problem, although the current incidence of coccidioidomycosis in all three branches is quite low. In this connection, Dr. Charles E. Smith, one of whose slides was shown in this presentation, has done yeoman service in making serologic tests available for members of the Armed Forces, in furnishing antigens, and so forth. But I am sure that Dr. Harrell's concept is correct and that we will be seeing more of these.

This is certainly a disease that can easily be missed if one does not think of it, and as pointed out, our dependency on the coccidioidin test does not have a very firm basis.

\* \* \* \* \*

#### Declining Severity of First Attack of Rheumatic Fever<sup>1</sup>

\*Florence E. Mayer MD, Eugenie F. Doyle MD, Lee Herrera MA, and Katharine D. Brownell MD, M.P.H., New York, N. Y. Amer J Dis Child 105: 146-152, February 1963.

Data reported from several localities suggest a decrease in the incidence of acute rheumatic fever. Hitchens demonstrated this trend as early as the 1930's in Cardiff, and Robinson observed a progressive decrease in initial attack rates among San Francisco school children in a 10-year span from 1946 to 1955. Although it is of interest to note the decrease in the number of cases admitted to Bellevue since 1943, admissions to a single hospital cannot be said to reflect the incidence in the general population. Even though the admission policy

\* Assistant Clinical Professor of Pediatrics (Dr. Mayer); Associate Professor of Pediatrics (Dr. Doyle); Instructor, Department of Medical Statistics (L. Herrera); Assistant Professor of Clinical Pediatrics (Dr. Brownell).

<sup>1</sup> From the Department of Pediatrics and Medical Statistics, New York University Medical Center. Supported by the Health Disease Control Program, U.S. Public Health Service, Contract No. SApH 71237.



regarding rheumatic fever has remained unchanged on this service, shifts in population in the area, changes in economic status, and referral patterns have undoubtedly occurred which influence the number of admissions. The fall-off of cases in this group has been shown to be due largely to a marked decrease in numbers of cases with chorea.

The severity of rheumatic fever is often considered in terms of cardiac disease and death. Reports have been published of a decrease in incidence of acute carditis, of a decline in the incidence of heart disease after the acute attack of rheumatic fever, and of decreasing mortality rates since the 1920's. In this study the percentage of the total admitted cases which developed cardiac disease and/or died showed certain trends subject to significant analysis.

It has been shown that acute carditis was diagnosed in a significantly smaller percentage of patients in the last of three 8-year periods, 1951 through 1958. This decrease, though significant, is modest, comparing in degree with that found by Bland in his study of four decades up to 1950 in Boston. It has been demonstrated how the inclusion in the present study of cases with uncomplicated chorea—which were not included by Bland—masked the downward trend and, in fact, produced an apparent increase in carditis in the second period by their disproportionate occurrence in the earliest period. Since the incidence of carditis, diagnosed at any time during hospitalization, is subject to the influence of prevailing therapeutic regimens in a given period, attempt was made to assess the incidence of carditis before therapy by documenting the cases with significant murmurs on admission. A similar trend was observed for the group as a whole: a small decline in the last period with little difference between the first two periods.

Data which do not lend themselves to statistical analysis, either through their inconsistent nature or through the small number of cases involved, but which are nevertheless interesting to note, are the decreasing incidence of cardiac enlargement by X ray—also noted by Bland in his study—and an apparent decrease in the percentage incidence of pericarditis in the last period.

The most striking change observed in this analysis is the definite and significant decrease in residual heart disease, chiefly involving the mitral valve, diagnosed at the time of discharge from the hospital. Again, the greatest increment of change is seen to be in the last period, 1951 through 1958. The effect of variations between periods in length of hospital stay has been examined. Exclusion of cases discharged before 8 weeks of hospitalization which were more numerous in the first two periods has been shown to exaggerate, if anything, the downward trend.

Although the number of deaths occurring during the acute illness was small in all periods, the progressive decrease in mortality rates is significant.

The factors which may have contributed to these trends may well be numerous. They must include the multiplicity of external events which alter the response of the host: changes in socioeconomic status, in child care programs, in therapeutic approaches. Of these, the last would seem to be of greatest importance in the decreasing incidence of heart disease and death since 1951. Although an analysis of the effect of various forms of therapy could not be



undertaken in this uncontrolled study, one may state that on this service all patients with acute rheumatic fever have received therapeutic doses of penicillin since 1951, whereas from 1943 to 1951, sulfadiazine, and later penicillin was used sporadically. Steroid therapy has also been used more extensively in the last period. Moreover, there is no doubt that antibiotic therapy of acute upper respiratory infections has been more widespread in these years than previously. The role of changes in socioeconomic status can only be presumed. An improvement in living conditions, general medical care, education, and other factors has undoubtedly occurred in the area served by the hospital over this span of years. It is interesting that the changing racial pattern, with an influx of Puerto Ricans, has been shown—if anything—to decrease the downward trend in rates of cardiac disease. The difficulties encountered in attempting to relate socioeconomic factors to a decreasing incidence or severity of a disease is shown by Hitchens who explored in detail the social background of his survey in Cardiff. The major rate of decline in incidence of acute rheumatic fever was found actually to occur during a period of economic depression in the 1930's and was, moreover, paralleled by a decrease in incidence of many reportable acute infections.

The minimal changes occurring between the first and second periods of this study were somewhat surprising and perhaps lend weight to the impression that therapy is the factor contributing most to the decreased severity of the disease.

\* \* \* \* \*



## MISCELLANY

### Admiral Anderson Reelected President - Navy Mutual Aid Association

The Board of Directors of the Navy Mutual Aid Association, at their Annual Meeting on 15 February 1963, announced the reelection of Admiral George W. Anderson Jr, as President. Other officers elected by the membership were Rear Admiral A.H. Van Keuren USN RET, First Vice President; Vice Admiral V.R. Murphy USN RET, Second Vice President; Lieutenant General W.M. Greene Jr, USMC, Third Vice President; Vice Admiral K.K. Cowart USCG RET, Fourth Vice President; and Captain P.R. Engle MC USN, Vice President-Medical Director.

Elected to the Board of Directors were:



RADM L. A. Bachman USN RET  
CAPT P. M. Boothe CEC USN  
RADM J. W. Bottoms SC USN  
ADM Arleigh Burke USN RET  
RADM J. W. Crumpacker SC USN  
RADM W. E. Ellis USN

RADM J. B. Heffernan USN RET  
RADM A. S. Heyward Jr, USN  
RADM R. L. Moore Jr, USN  
LTGEN J. C. Munn USMC  
CAPT G. D. O'Brien USNR  
LCDR J. F. O'Neil USN  
RADM A. M. Shinn USN

The Board of Directors reappointed Captain T. S. Dukeshire SC USN RET as Secretary and Treasurer and Lieutenant Commander M. E. Koepke MSC USN RET as Assistant Secretary and Treasurer. Vice Admiral V. R. Murphy USN RET was continued in office as Chairman of the Finance Committee; Vice Admiral K. K. Cowart USCG RET as Chairman of the Membership Committee; and Rear Admiral L. A. Bachman USN RET as Chairman of the By-Laws Committee.

The Chase Manhattan Bank of New York was continued as investment counsel for the Association, and the Morgan Guaranty Trust Company of New York retains custody of the Association's securities. The actuarial firm of Bowles, Andrews & Towne of Richmond, Virginia, will continue to serve as the Association's actuarial adviser.

Admiral Anderson commented on the expanding responsibilities of personnel in the naval and military forces, and the increased importance to these personnel of the Navy Mutual Aid Association and the other service organizations. Navy Mutual Aid's reputation, he considered, was enviable but well deserved.

Captain Dukeshire reported that membership increased by 10% in 1962 to 37,486 members, and that the Association's assets on 31 December 1962 were \$61,574,645.

\* \* \* \* \*

#### SEABEE'S NEWEST MISSION - STAT

Port Hueneme, Calif. The newest mission providing technical assistance in a disaster situation, and to friendly nations throughout the world, has moved into high gear with the procurement and packaging of standardized equipment and tool allowances to be used by Pacific Seabee Technical Assistance Teams (STAT).

STAT teams, normally one officer and 12 to 15 men, have already become known as an elite group. Ranging from petty officers to master chiefs, each man is exceptionally capable in other Seabee rates as well. To further broaden their usefulness, STAT members have been given instructor training, foreign language instruction, and familiarization with advance base components. Under direction of the Construction Battalion Base Unit, six basic outfits are being assembled, four for prepositioning at Port Hueneme and two for Okinawa. Each outfit is broken down into two parts, an airlift component and a sealift component.



The airlift material will accompany the STAT members and will put them into immediate operation in a construction or disaster area. Included are such things as jeeps and a 3/4 ton truck (each with trailers), a small amount of repair parts and construction material, and fuel to keep the equipment running. Also, equipment for setting up a small camp, the men's personal gear and field equipment, rations, medical supplies, and a small amount of communications equipment.

The sealift component will be shipped at the same time for later arrival. It contains larger quantities of material similar to that in the airlift component, plus heavy automotive and construction equipment, such as 5-ton dump truck, motor grader, bulldozer, and flood light trailer. The important feature of the sealift outfits is that, if necessary, they can be broken down into airlift components at the point of debarkation. In some instances, where roads are impassable or nonexistent, airlift would be the only means of moving material into the interior.

Over the years, the Seabees have built a formidable reputation for accomplishing the impossible under the worst of conditions. They have built and they have fought. Now another chapter in their history is about to be written. In lending their talents to help relieve a disastrous situation or to help other nations to improve standards of living, perhaps they will find their most illustrious role. —NAVNEWS, 1 February 1963

NOTE: The great potential value of STAT in supporting emergency medical relief work in remote or inaccessible disaster areas of the world is readily apparent. Disease and injury casualties should have appropriate shelter, regardless of the climate, the season of the year, or the geographic location.

—Editor

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#### USS HAVEN Receiving Overhaul

The Long Beach Naval Station lost its hospital recently when three tugs towed it away. It wasn't as difficult as might be imagined, though. The hospital is the USS HAVEN (AH 12), a hospital ship built originally for the Maritime Commission as a C-4 vessel.

She was moved from the Naval Station's pier 7 to the Todd Shipyard, a two and one-half hour journey, in her first time away from the pier in 6 years. The HAVEN is undergoing a 3-month yard period during which she is receiving an extensive renewal of firemain, heating, and air conditioning systems. The ship's operating room will be refurbished, a new postoperative recovery room will be installed and a new entrance will be cut in the skin of the ship to permit pier level entry for patients.

After overhaul, the HAVEN will be returned to the Naval Station to continue her mission as a Naval Hospital in the status of "In-service-in-Reserve."

—NAVNEWS, 15 February 1963



## SECURITY TRAINING

### YOU CAN DEFEAT AN ENEMY AGENT

Any experienced espionage agent knows **WHAT INFORMATION TO LOOK FOR** and **WHERE IT IS KEPT**. His problem is to **FIND THE MOMENT WHEN THE MATERIAL IS UNPROTECTED**; if this moment comes, he will take advantage of the opportunity.

Such an opportunity exists wherever physical security is lax, particularly where everyone does not observe the rules for protection of classified documents and equipment. The opportunity exists in spite of guards, circulation control, restricted areas, fencing, lighting, alarm systems, and many other safeguards; it exists because of human errors within working areas. Such errors are numerous and varied. Only two are discussed here.

### HUMAN ERRORS

One important human error is failure to keep classified material under observation when it is not guarded or stored. A person entering an area where classified material is kept is naturally curious. If the person responsible for the classified material should be careless and fail to keep the classified material continuously under observation, he is providing an opportunity for a security violation right under his own nose.

The incidence of security violations seems to indicate a lack of security planning within certain offices. The time to prevent violations is **BEFORE** they happen. Take the following steps:

1. Anticipate problems.
2. Have a firm standard operating procedure.
3. Be sure everyone attends security meeting.
4. Know how to handle visitors.
5. Know where **NOT** to keep safe combinations.

Another human error is lack of instruction and supervision of individuals who lock safes or cabinets or those who perform security check. Responsibility for **WHO** will check **WHAT** and **WHEN** must be clear-cut.

Most reports of security violations indicate that personnel are negligent in performing **ROUTINE** duties. A violator of security regulations who would willingly die for his country may not be completely sold on the idea of routine steps which protect classified information from unfriendly foreign powers. The importance of care in performing **ROUTINE** security duties cannot be overemphasized.

### SAFE COMBINATIONS

Safe combinations offer a tremendous temptation with respect to security violations. Writing a combination on a desk pad, hiding it under a blotter, or carrying it in a purse, billfold, shoe, or hatband is no safer than putting a key under the doormat. A person who makes use of such methods to keep track of a combination would be insulted if his mental powers were questioned, but they **SHOULD** be questioned if he is not using them. The only safe place for a combination is in your head.

### SUMMARY

Physical security is largely a matter of common sense. Maximum security will be achieved if every person gives information pertaining to national defense the same protection that he gives his most precious personal possessions. Remember: an espionage agent knows what information to look for and where it is kept. His job is to find the moment when it is unguarded. We can make his job harder—or impossible—by following conscientiously the simple rules for protecting classified matter.

(Naval Training Bulletin, NAVPERS 14900, Winter 1962-63)

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PHS Announcement on Chickenpox

Surgeon General Luther L. Terry of the Public Health Service announced on 14 February 1963 that chickenpox has been added to the list of communicable diseases for which persons entering this country may be detained for observation or maintained under close surveillance, when smallpox must be ruled out.

Commenting on the new policy and planned change in Service regulations Dr. Terry said: "It is well recognized that chickenpox and smallpox may be confused, and that a period of observation and testing may be necessary to determine that one of these diseases is present rather than the other. This is a threat among travelers who come to us from places where they may have been exposed to both. The new regulations will strengthen our procedures for preventing the importation of smallpox into the United States from those parts of the world where the disease is still present."

The Public Health Service's Division of Foreign Quarantine is on guard with protective measures 24 hours a day at more than 300 ports of entry to prevent the entrance of dangerous communicable diseases into the country.

—From U. S. Dept of HEW, Public Health Service

\* \* \* \* \*

Electric Shock Prevention

From Bureau of Ships Journal, Vol 12, No. 2, p 24, February 1963.

Minor electrical shocks must never be disregarded. They are often the forerunner of fatal shock accidents. Equipment which gives even a momentary tingle to someone touching it should be repaired at once by an authorized person. This precaution is only one measure which should be taken to help cut the death rate from electric shock. During the last 3 years, 23 men have been killed by electric shock aboard Navy ships. Preventing future fatalities is a job requiring the cooperation of everyone in the Fleet and the Bureau.

The Bureau tries to provide electrical equipment which will be safe under all possible conditions. This goal has not yet been achieved and may not be humanly possible, but the effort will continue.

In the meantime, the Bureau has produced the following publications and film to promote electrical safety:

115 Volts—Deadly Shipmate (MN 8990), a Navy film.

Electric Shock—Its Causes and Its Prevention (NavShips 250-660-42).

Electric Shock and Its Prevention (NavShips 250-660-45).

How to Keep Electricity from Killing You (NavShips 250-660-78).

Safety Posters (NavShips 250-660-46 to 250-660-57).

Copies may be obtained through normal supply channels. The Bureau of Ships Journal is not in a position to fill requests for them.—BuShips Journal

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IN MEMORIAM

CAPT Herbert L. Barbour MC USN (Ret)	29 December 1962
CAPT George A. Barunas MSC USN	12 January 1963
CAPT John T. O'Connell MC USN (Ret)	27 December 1962
CAPT Sherman M. Peabody MC USN (Ret)	11 November 1962
CAPT Charles B. Stringfellow MC USN (Ret)	10 January 1963
CDR Clara L. Lampp NC USN	19 November 1962
CDR John A. Marsh MC USN (Ret)	13 January 1963
CDR Claude D. Roop MC USN (Ret)	22 December 1962
LCDR Glaister H. Ashley MC USN (Ret)	20 August 1962
LCDR Franklin G. Weterell MSC USN (Ret)	4 November 1962
LT John A. Ross MSC USN (Ret)	19 November 1962
LTJG Theodore T. Sizemore MSC USN (Ret)	1 February 1963
LTJG Nell D. Weaver NC USN (Ret)	6 February 1963
ENS Alma G. Stiansen NC USN (Ret)	25 January 1963

\* \* \* \* \*

Naval Medical Research ReportsU. S. Naval Medical Research Institute, NNMCI, Bethesda, Md.

1. Summaries of Research: 1 January - 30 June, and 1 July - 31 Dec 1961.

U. S. Naval Medical Research Unit No. 3, Cairo, Egypt.

1. Morphologic Study of *Phlebotomus Papatasi* (Scopoli) from Egypt (Diptera: Psychodidae) MR 005.09-1202.5.02, July 1962.

U. S. Naval Dental Research Facility, Dental Department, Administrative Command, U. S. Naval Training Center, Great Lakes, Ill.

1. Strength, Dimensional Change, and Adaptation of Amalgam Prepared with the 5:5 Ratio: MR 005.12-5004.11, April 1962
2. Relation of Periodontal Health in Naval Recruits to Hygiene, Professional Dental Care, and Education: MR 005.12-5004.12, May 1962.
3. Infrared Studies of Human Saliva: MR 005.12-5004.8, June 1962.
4. Hemagglutination-Inhibition Activity of Human Parotid Saliva: MR 005.12-5004.10, June 1962.

U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Penna.

1. Effects of Applied Ocular Pressure and of Positive Acceleration on Photoc Driving in Man: MR 005.13-6002.1 Report No. 16, December 1962.
2. Flame Contact Studies I. Apparatus and Method for Determination of Heat Transfer Through Fabric During Flame Contact: MR 005.13-1005.1 Report No. 28, December 1962.



3. Flame Contact Studies II. Experimental Validation of Mathematical Analysis of Heat Flow: MR 005.13-1005.1 Report No. 29, December 1962.
4. Flame Contact Studies III. Determination of Thermal Properties of Materials in Thin Layers: MR 005.13-1005.1 Report No. 30, December 1962.
5. The Perception of Oculogravic Illusions by Inverted Subjects: MR 005.13-6002.5 Report No. 2, July 1962.
6. Lever Displacement During Continuous Reinforcement and During a "Discrimination": MR 005.13-0002.16 Report No. 8, July 1962.
7. Effects of Positive Pressure Breathing on Performance During Acceleration: MR 005.13-1004.1 Report No. 7, July 1962.

U. S. Naval Medical Field Research Laboratory, Camp Lejeune, N. C.

1. Recovery of PPLO of Atypical Pneumonia on Artificial Agar Medium: MR 005.09-1204.4.10, January 1963.
2. User Test of Portable Turbojet High Speed Dental Handpiece Unit: MR 005.12-6001.6, July 1962.
3. Transient Deformation in a Non-Metallic Helmet: MR 005.12-7010.1.13, August 1962.

U. S. Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn.

1. Memorandum Report No. 62-4. Intradermal Injection of 2,6 Dichlorobenzene-Neindophenol for the Tissue Level Determination of Ascorbic Acid: MR 005.12-5220-3.03, April 1962.
2. Prediction of Adjustment to Prolonged Submergence Aboard a Fleet Ballistic Missile Submarine II. Background Variables: MR 005.12-2200-1.04 Report No. 384, July 1962.
3. Bacterial Flora in Fleet Ballistic Missile Submarines during Prolonged Submergence: MR 005.14-3002-4.06 Report No. 386, September 1962.
4. Method for Improving Accuracy of Air Particulate Activity Measurements: MR 005.14-3002-4.07, October 1962.
5. Development of Hyaline Membranes and Atelectasis in Experimental Chronic Respiratory Acidosis: MR 004.14-3002-1.08 Report No. 391, October 1962.
6. Palmar Perspiration Index and Pursuit Tracking: MR 005.14-1100.02.04 Report No. 392, November 1962.
7. Intensity and Contour Effects in Visual Masking: MR 005.14-1100-2.05 Report No. 394, December 1962.
8. Memorandum Report No. 62-5. Some General Comments Concerning Personnel Selected for Hazardous Duty--After Six Years of Research in Submarine Selection: MR 005.14-2100-1.10, October 1962.
9. Memorandum Report No. 61-12. Effect of Prolonged Exposure of Animals to High Ambient Pressures of Air and of Synthetic Gas Mixtures: an Abstract MR 005.14-3100-3.02, December 1961.
10. Syndrome of Decompression Sickness in Historical Perspective: MR 005.14-3100-2.05, December 1961.



11. Interaction of Aerosols and Air Ions: MR 005.14-3300-5.05 Report No. 380, March 1962.
12. Dental Examination Reliability: MR 005.12-5220-3.01 Memorandum Report No. 62-2, April 1962.
13. An Improved Method for Intra-Oral Polishing Procedures MR 005.12-5220-3.02 Memorandum Report No. 62-3, April 1962.

U. S. Naval Hospital, Oakland 14, California

1. Aminoaciduria in an Elderly Man with the Nephrotic Syndrome and in a Young Man with a Variant of the Fanconi Syndrome: MR 005.12-1103.10, March, 1962. (Attn: Clinical Investigation Center)
2. Thigh Pad for Simulated Intramuscular Injections: MR 005.12 0400, July 1962. (Attn: Navy Prosthetic Research Laboratory)

U. S. Naval School of Aviation Medicine, Aviation Medical Center, Pensacola, Florida.

1. Comparison of Ocular Counterrolling Movements Between Normal Persons and Deaf Subjects with Bilateral Labyrinthine Defects: MR 005.13-6001 Subtask 1 Report No. 68, February 1962.
2. A Study of CO<sub>2</sub> Build-up with a Neck Seal Substituted for the Face Seal in the Full Pressure Suit Helmet: MR 005.13-3100 Subtask 8 Report No. 11, June 1962.
3. Survival of Animals in Magnetic Fields of 120,000 Gauss MR 005.13-9010 Subtask 1 Report No. 6, July 1962.
4. Frequency Response of the Human Semicircular Canals II Nystagmus Phase Shift as a Measure of Nonlinearities: MR 005.13-6001 Subtask 1 Report No. 73, July 1962.
5. Changes in Serum Lipoproteins Following a Large Fat Meal in Normal Individuals and in Patients with Ischemic Heart Disease: MR 005.13-7004 Subtask 3 Report No. 12, August 1962.
6. Counterrolling of the Human Eyes Produced by Head Tilt with Respect to Gravity: MR 005.13-6001 Subtask 1 Report No. 75, September 1962.
7. A Note on the Influence of Nuclear Collision on the Radiation Dose from Flare Produced Protons in Space: MR 005.13-1002 Subtask 1 Report No. 23, September 1962.
8. Structure of Inner Ear Sensory Epithelial Cells in Relation to their Functions: MR 005.13-2005 Subtask 4 Report No. 1, November 1962.
9. Physiological and Psychological Evaluation of Vest-Type Load-Carrying Systems: MR 005.01-0030.1.1, January 1963.

U. S. Naval Medical Research Unit No. 2, Taiwan.

1. Thai Haptoglobin Distribution: MR 005.09-1601.7.2, September 1962.
2. Glucose-6-Phosphate Dehydrogenase Deficiency: MR 005.09-1901.2.4, September 1962.
3. Prophylactic Therapy of Japanese Encephalitis Passive Immunization Combined with CO<sub>2</sub> Inhalation: MR 005.09-1201.2.10, October 1962.



From the Note Book

Space and Astronautics Orientation Course. This course has been established to give senior officers of the Navy a better understanding of this new technology, its application to naval warfare and its important role in national defense. The course is in consonance with the Navy's global mission and emphasizes the significant impact of astronautics on sea power. It is primarily designed for those senior officers who have not had the opportunity to gain knowledge of astronautics and our current Space programs. A highlight of the course is a visit to the space vehicle launch and control facilities at Point Arguello Naval Missile Facility and at Vandenberg Air Force Base.

Location: U. S. Naval Missile Center, Point Mugu, California

Duration of Course: Four (4) days (Tuesday - Friday)

Convening dates of Course: 23 April 1963

7 May 1963

14 May 1963

4 June 1963

18 June 1963

BUMED Quota: One (1), each class

Deadline Date to Apply: Six (6) weeks in advance of convening date

Eligibility: Rank of Commander and above. TOP SECRET Security Clearance required.

Requests should be forwarded in accordance with BUMED Instruction 1520.8 and comply with the deadline dates as indicated above. All requests must indicate that a Security Clearance of TOP SECRET has been granted to the officer requesting attendance, and if Bachelor Officers' Quarters are desired.

—Training Br., Prof. Div., BuMed.

NMRI's Doctor Benzinger Receives High Honor. A Chevy Chase, Md., physician and scientist has been awarded the Golden Scheele Medal of the Chemical Society in Stockholm, Sweden.

This honor was bestowed upon Dr. Theodor H. Benzinger, Director, Bio-Energetics Laboratories at the Naval Medical Research Institute, National Naval Medical Center, Bethesda.

Dr. Benzinger is the second American to win the Golden Scheele Medal since its establishment in 1930. Professor Otto Folin from Harvard College, Cambridge, Mass., was the first recipient.

His award-winning achievement, entitled "The Calorimetric Analysis of Chemical Change" was delivered at the University of Stockholm on January 30.



The Golden Scheele Award commemorates the Swedish chemist, Carl Wilhelm Scheele. Dr. Scheele is well-known in the medical profession as perhaps the founder of the greatest number of individual discoveries in chemical compounds.

Dr. Benzinger, a native of Stuttgart, Germany, was educated at the Universities of Tuebingen and Freiburg, Germany.

The 58-year-old Physician is a member of the New York Academy of Sciences; American Physiological Society and the Aero-Space Medical Association. He is also affiliated with the German Physiological Society and German Society of Scientists and Physicians.

Dr. Benzinger and family reside at 8780 Preston Place, Chevy Chase, Md. (P.I.O., NNMC, Bethesda, Md.)

Increased Expenses of American Hospitals. Cost of operating American hospitals increased nearly \$1 billion in 1961, according to statistics in the 1962 Guide Issue of Hospitals, Journal of the American Hospital Association. The cost was \$9,387,242,000, compared with \$8,420,986,000 in 1960. Hospital admissions rose also in 1961, to 25,474,370, nearly a half million more than in the preceding year.

The average cost per patient-day increased in all categories of hospitals. In non-Federal short-term general hospitals, which admit 91.7% of all patients, the average cost climbed \$2.75, from \$32.23 in 1960 to \$34.98 in 1961. This average included voluntary hospitals, \$36.04; proprietary, \$33.29; and State and local governmental, \$32.27. In long-term non-Federal hospitals, the average cost in psychiatric institutions was \$5.53; in tuberculosis hospitals, \$14.72; and in general long-term hospitals, \$14.49. Federal hospital average was \$23.34.

Payroll, \$6.2 billion in 1961 and \$5.6 billion in 1960, accounted for nearly two-thirds of the costs. The increase reflects additional hospital employees, 1.6 million in 1960 compared with 1.7 million in 1961, as well as higher salaries for the more highly skilled personnel needed to give today's specialized care. Expanding research, continued education of health personnel, higher prices for equipment, and the continually growing number of outpatients (whose visits are not counted in admissions) also boosted hospital expenses.

—Public Health Reports, Dept. HEW-PHS,  
78(1): 26, January 1963.

Doctor Joseph F. Saunders Gets Award. Doctor Joseph F. Saunders, Head, Medicine and Dentistry Branch, Office of Naval Research, Department of the Navy, was among ten young men in Government who were winners of 1963's Arthur S. Flemming Award for outstanding service.

Interior Secretary Udall, the key speaker at the awards dinner, praised the winners as symbolic of the many able people in Government "who are serving this country and its 180 million people and helping to hold the world together."

The awards are sponsored each year by the Junior Chamber of Commerce in co-operation with the Potomac Electric Power Company, Chesapeake



and Potomac Telephone Company and the Washington Gas Light Company. The award is named in honor of the former Secretary of Health, Education and Welfare and Civil Service Commissioner, who now is president of the University of Oregon.

BUMED INSTRUCTION 1510.4H

6 February 1963

Subj: Training available to Hospital Corps personnel, Group X

Ref: (a) Catalog of Hospital Corps Schools and Courses  
(BUMEDINST 1510.9)

1. Purpose. To promulgate information relative to training available to Group X, Hospital Corps personnel and to supplement reference (a).
2. Cancellation. BUMED Instruction 1510.4G is hereby canceled and superseded.

BUMED INSTRUCTION 6820.1E

15 February 1963

Subj: Subscriptions to professional periodicals; responsibility for procurement of

Ref: (a) NAVCOMPT Manual Vol. 3, Chapter 5, Part A, Section II, Subsection 5

1. Purpose. To inform addressees of procurement procedures for subscriptions to periodicals.
2. Cancellation. BUMED Instructions 6820.1D and 6820.1D SUP-1 are hereby canceled and superseded.

NOTE: This Instruction continues with sections on "periodicals recommended, procedure, and funding."

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Salmonellae in Easter Chicks. Poultry and poultry products are well established as sources of Salmonella infections for man. At least one outbreak of salmonellosis has been attributed to Easter chicks. The fact that the birds are handled primarily by children, a susceptible population, heightens the potential seriousness of the problem. The pilot study in Ohio emphasizes the need for a more extensive study of Easter chicks as sources of human Salmonella infection.

U.S. DHEW, PHS Public Health Reports 78(1): 11, January 1963.



## DENTAL



## SECTION

Oral Exfoliative Cytology

The Veterans Administration Dental Service began a Cooperative Study of Oral Exfoliative Cytology in 1959. This program was established in twelve hospitals and outpatient dental services and was designed to evaluate the reliability of the Papanicolaou scrapings of oral lesions for the early diagnosis of cancer under normal clinical conditions.

In using oral exfoliative cytology as a method to aid in earlier diagnosis of mouth cancer, cells which exfoliate naturally or are removed mechanically are fixed, stained, and studied under the microscope. Cytology laboratory personnel require some extra training to evaluate these oral specimens.

This technique is not intended to replace biopsies but to be used in conjunction with the histologic diagnosis. Consequently, in the Veterans Administration study the accuracy of the cytologic diagnosis was assayed against the biopsy. The cytology and biopsy specimens of the same mouth were independently evaluated and subsequently matched.

In this study 592 mouth lesions were examined. Of these, 315 were diagnosed as cancer and 277 as benign. Fifteen of the negative cytologic diagnoses were definitely in error. However, frequently the cytology was classified as cancer, or suspicious of cancer, but the first biopsy was negative. Repeat biopsies in these cases usually confirmed the cytologic diagnosis of cancer. In several cases three biopsies were required. In one case, 4 and in another 5 biopsies were needed to confirm the cancer diagnosis.

Suspicion of cancer is directly related to the experience and training of the examiner. The participants in this VA study had examined thousands of patients and had encountered many mouth cancers. Their index of suspicion was exceptionally high and, especially during this program, they were more likely to recommend biopsy than most dentists in private practice. Nevertheless, 62 cases of cancer in this series were completely unsuspected at the time of examination and were not recommended for biopsy. Seventeen were carcinoma in situ and forty-five were invasive carcinoma. It was only because the protocol of this study required that all lesions be scraped for cytological examination, whether or not cancer was suspected, that these cancers were discovered.

The major conclusions presented at the Third Annual Conference of this VA Cooperative Study of Oral Exfoliative Cytology are summarized as follows:

1. Oral exfoliative cytology is a reliable diagnostic tool for detection of mouth cancer.



2. Cytology is a sensitive test that may often complement biopsy for it can disclose cancer when the first biopsy is negative.
3. Oral cytology is a practical procedure that is readily applicable to medical and dental practice.
4. Mouth cancers are being observed and overlooked to a much greater extent than was previously realized.

#### References:

1. Interim report of VA Cooperative Study of Oral Exfoliative Cytology - 1961.
2. VA Cooperative Study of Oral Exfoliative Cytology - Third Annual Conference, October 29, 1962.

NOTE: This brief of the V.A. exfoliative cytology study is presented to provide background information concerning a subject which is receiving considerable space in professional journals. However, conclusions from these presentations could stimulate a feeling among dentists and patients that exfoliative cytology is the panacea for diagnosis of cancer. This is a dangerous assumption, for special training is required in both the scraping technique and the interpretation of the pathologist's report. Even after this training the consensus is that it should only be used in combination with a biopsy to aid in the earlier diagnosis of mouth cancer.

The most important conclusion from this study is the emphasis placed on the fact that no mouth lesion may be discounted without investigation, regardless of the experience of the examiner. It must be said again "the one who sees the lesion first has the best chance to prevent or treat cancer."

—Dental Division, BuMed.

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#### What Leadership Means to Me\*

R. L. Kaser, AMCM, wrote the following article to define leadership while attending the VF-124 Leadership and Reemphasis Course for Petty Officers.

Many volumes have been written on the definition of leadership, but the most accurate and concise definition that can be put in a single sentence is: "The art of accomplishing a mission through people."

The fact that the mission is completed indicates leadership was involved. This does not necessarily indicate the leadership was good or bad. It could have been either. By carefully observing how the mission was accomplished we can determine the type of leadership involved. If the mission or task was completed promptly and efficiently, and all hands were proud of the result, then I feel the leadership was good.

A few of the principles and traits I feel are necessary toward good leadership are:



1. Set a good example: I believe the most important thing which could be singled out as a quality of a good leader is to set a good example. The old adage "monkey see, monkey do" is just as true today as it ever was.

2. Indicate responsibilities: Let your men know who you are, your responsibilities, and what you expect of them.

3. Keep informed: Keep your men well informed. Let them know as far as possible any changes in policies, assigned tasks, or mission.

4. Know your men: Learn to know your men. Find out about how they were raised, their families, hobbies, sports, likes, dislikes, etc. Treat them accordingly as individual human beings and not as some inanimate object or machine.

5. Assign tasks and responsibilities: Give each individual a task or job to do. Give him the responsibility, but never fail to give him the authority and the privileges of the assignment.

6. Be fair and consistent: If you discipline a man for a poor job, you should be just as quick to praise him for a job well done.

This is far from being a complete and detailed account on the qualities, traits, and aspects of good leadership. However, I feel once you have these items thoroughly understood and practically applied, you are well on the way to becoming a good leader. This type leader is admired by his men with loyalty and confidence.

\*Miramar Jet Journal, 7 Dec 1962.

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#### Personnel and Professional Notes

Re-Evaluation of Dental X-Ray Units. The Dental Division of the Bureau of Medicine and Surgery, in cooperation with the Division of Radiological Health of the United States Public Health Service, plans to conduct a resurvey in late March or April, 1963, of all dental x-ray units in use in the United States Navy.

Each dental facility will be furnished, at the rate of one per dental x-ray unit in use, a sealed Manila envelope which will contain the leaded portion of a standard exposure holder and an 8x10 inch slow industrial type x-ray film on which will be mounted an aluminum step wedge and a lead coding number.

Specific instructions for exposing the film will be printed on the outside of the envelope.

This survey is designed to check the total filtration (inherent and added), the symmetry and diameter of the useful x-ray beam, and leakage from the portal end of the tube. In addition it will furnish information on the effectiveness of the survey conducted in January of 1962.

Credit Points for Reserve Dental Officers. Reserve Dental Officers will receive credit points without pay for attendance at the Postgraduate Course in



Pathology of the Oral Regions to be presented at the Armed Forces Institute of Pathology, Washington, D. C. from 25-29 March 1963.

Orders to this meeting will not be required, as an arrangement has been made to take the roll at the meeting. One point credit will be awarded for each day of attendance of at least three hours.

Sessions last from 0845 to 1200 and 1345 to 1530 each day with evening sessions on Monday, Wednesday, and Thursday.

U. S. Navy Dental Corps Continuing Training Program. The U. S. Naval Dental Corps is offering a series of short postgraduate courses conducted by members of the staff of the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md.

The course in "Fixed Partial Dentures" will be offered 15-19 April 1963. This course presents a practical approach to crown and bridge prosthetics by means of lectures, seminars, demonstrations, and laboratory procedures. High-speed operative procedures are utilized. Indications for the use of various tooth preparations and impression materials, as well as waxing and investing procedures are included.

The instructor will be Capt J. W. Pepper, Jr., DC USN. Quotas have been assigned to ComOne, ComThree, ComFour, ComFive, ComSix, ComNine, PRNC, SRNC, and CNATRA.

This short course is open to active duty career dental officers of the Armed Forces in accordance with quotas established by the Bureau of Medicine and Surgery.

Applications should be received in the Bureau as early as possible and preferably, not less than 4 weeks prior to commencement of the course. The Bureau Professional Advisory Board will make recommendations on all requests, and upon approval by the Surgeon General, applicants will be notified as to the final action. Those approved will be nominated for TAD or authorization orders, as appropriate. Accounting data will be forwarded to individual officers nominated for TAD orders. Staff Dental Officers not utilizing assigned quotas shall report this information to BUMED, Code 6111, one month prior to the convening date of the course. This will allow the Bureau to fill the quota from other districts.

Dr. Dixon Lectures at U. S. Naval Dental School. Dr. Russell A. Dixon, Dean of the School of Dentistry, Howard University, Washington, D. C., lectured on "Urgency and Demand for Continuation Education in Dentistry" to staff, resident, and postgraduate dental officers, and civilian and military guests at the U. S. Naval Dental School, Bethesda, Md., on Thursday, 3 January.

Dr. Dixon is a Past President of the National Dental Association and the Pan American Odontological Association. He has served as a Consultant to the Veterans Administration and the Council on Dental Education of the American Dental Association. He is a Fellow of the American College of Dentists and holds Honorary Memberships in the Robert T. Freeman Dental



Society and The Maimonides Society. He is in Who's Who in America, 1962-1963, and serves on the Board of Trustees of the American Cancer Society, District of Columbia Division.

Dental Health Education Lectures. A series of 22 dental health education lectures was presented by Dental Officers of the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md., to the children of eight Montgomery County (Maryland) Public Schools during National Children's Dental Health Week, February 3 to 9. Over 2,000 children were in attendance. Oral hygiene and methods of preventing dental disease were stressed by demonstrations.

The officers participating in this program were Capt G. H. Rovelstad, DC USN; LCdr R. H. Howard DC USN; LCdr A. D. Sanderson DC USN; LCdr E. T. Witte DC USN; LCdr R. H. Spicer DC USN; and Lt J. S. Lindsay DC USN.

Dental Officers Attend Casualty Course. Eleven dental officers, including two from the U. S. Air Force, and one civilian dentist have completed the Casualty Treatment Training Course conducted by Capt R. C. D'Vincent DC USN, in the Dental Department at the Naval Administrative Command, U. S. Naval Training Center, San Diego, California. The Air Force officers were from George Air Force Base, California and Chanute Air Force Base, Rantoul, Illinois. The civilian dentist, selected by the American Dental Association, was the Assistant Chief, Public Health Dentistry, State of Colorado Department of Public Health. The next class will convene 18 March 1963, at the U. S. Naval Training Center, San Diego, California.

Contract for Repair of Higher Speed Dental Handpieces. The Dental Division of BuMed has recently completed distribution of the contract for the repair of higher speed dental handpieces. The provisions of this contract are effective 1 March 1963. Additional copies may be obtained by letter request to Chief, BuMed, Attention: Code 612.

The Problem Facing Dentists Even in the Better Developed Countries. "In the United States it is estimated that there are in the neighbourhood of 700 million untreated cavities, an average of nearly four per head of the population. By the age of 50, nearly 50% of the population have developed periodontal disease and by the age of 65 nearly 100%. A little over 40% of the population visit a dentist every year, an additional 30% receive some care, and the rest, about one third of the nation, no care at all, except a possible extraction to relieve pain." —Dr. G.H. Leatherman, Secretary General of the International Dental Federation. WHO Chronicle 17(1): 26, January 1963.

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## OCCUPATIONAL MEDICINE

### Oxides of Nitrogen

Submitted by A. V. Munton, U. S. Naval Shipyard, Portsmouth, New Hampshire, for the Quarterly Occupational Health Release, No. 35 of October-December, 1962.

Inhalation of oxides of nitrogen by a pipefitter brazing in a ship's tank resulted in his hospitalization with a chemical pneumonitis. He had been brazing with an oxyacetylene torch on a brass coupling, with a #3 silver alloy insert, on a copper nickel pipe, in a tank 750 cubic feet in volume, for approximately 15 minutes without using exhaust ventilation, when a fellow worker also in the tank but only intermittently, noticed the irritant gases and inserted a temporary ventilation exhaust hose in the tank. The brazer continued working for another 30 minutes, at which time he felt faint, with dizziness and spots before his eyes. He experienced some improvement after leaving the tank and inhaling oxygen from the oxygen line of his torch. A pneumonitis developed within 24 hours and he was hospitalized at that time. The fellow worker, having a much shorter exposure, did not become ill.

Tests were performed under simulated conditions to determine the gaseous concentrations which would be produced by brazing with an oxyacetylene torch and #7 tip in an unventilated space. Oxides of nitrogen, as determined by the phenoldisulfonic acid method, increased at a constant rate from 80 p. p. m. two minutes after the brazing started to 250 p. p. m. at eight minutes. (This was equivalent to 1300 mg. per minute of nitrogen oxides). The same concentrations resulted from brazing on both brass and bronze. Tests for carbon monoxide were negative.

In only a few minutes concentrations developed which could produce the acute symptoms experienced by the brazer. A review of experimental studies reported in the literature indicate that 100 p. p. m. to 150 p. p. m. will cause marked irritation of the larynx, coughing and dangerous irritation of the lower respiratory tract after a short exposure (1/2 hour to 1 hour). At concentrations above 200 p. p. m. a short exposure can become rapidly fatal.

To prevent recurrences it was recommended that, whenever an oxyacetylene flame is used in a confined space, positive ventilation must be provided to remove the gases or employees must wear air supplied respirators. Exhaust ventilation away from the operator at a minimum of 500 c. f. m. is required within 8" to 12" of the flame, or general ventilation of one air change per minute.



### Deadly Fumes of Nitrogen Oxides

National Institutes of Health-Plant Safety Branch-News, December 1962,  
U. S. Department of Health, Education, and Welfare, Public Health  
Service.

A few weeks ago as a cleaner dumped the contents of a "combustible" lab waste basket, a bottle of nitric acid broke into his collecting GI can. Orange-brown oxides of nitrogen fumes quickly contaminated the corridor area. The MOD treated five investigators, a guard, and the cleaner for possible lung involvement. Fortunately no injuries occurred although serious lung edema can result from brief exposure to this insidious chemical. The Scientific Director criticized the technician for his negligence.

Twice in the last few months cellulose nitrate tubes have caught fire in ovens. As the technician noticed nitrogen oxide fumes, she opened the oven door to inspect and was greeted by a mild explosion as the tubes burst into flames. She had repeated this drying process for many months. This time, however, she did not notice that someone had changed the temperature setting from 100° F. to 150° F.

Oxides of nitrogen fumes are not too obnoxious nor alarming since they do not force one to cough excessively, but they may cause serious injury or death by filling the lung with fluid 8-10 hours after exposure. In 1929, 125 people died when burning x-ray film fumes entered the ventilation system of the Cleveland Clinic.

Substitute polyethylene or polypropylene tubes whenever possible. Do not autoclave cellulose nitrate tubes - they may explode! For suggestions on sterilization, call the Plant Safety Branch.

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### Fumigation, Methyl Bromide, Control Measures

Mr. Salvatore DiLustro, Senior Industrial Hygienist at Quonset Point Naval Air Station for the Quarterly Industrial Health Report, No. 34, July through September 1962.

The Industrial Hygienist, Quonset Point, R.I., planned and supervised the health and safety phase of fumigation of the devastating imported snails, in cooperation with the U. S. Department of Agriculture, Plant Quarantine Division. These snails, which eat all types of vegetation, came in by MCB #7 Navy Cargo from Rota, Spain.

A heavy plastic tarpaulin was placed well over the top and around the sides of the Conex Box which contained the snails, and methyl bromide was introduced as the fumigant in the box and around the sides. The Fumiscope indicator was used to control the concentration of methyl bromide in ounces per 1000 cu. ft. The initial concentration was 95 oz/1000 cu. ft. down to

60 oz/1000 cu. ft. at completion. Adequate protective measures were practiced. Respiratory fresh air lines with proper masks, clothing and water were made available. The halide detector was used as well as the Davis Halide Meter to record methyl bromide leaks and concentration.

At the end of the fumigation period, the gas was exhausted through a long section of flexible duct line to the outside atmosphere. The fumigation process lasted 72 hours, proved very effective and proceeded without incident.

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### Design Considerations for Indoor Firing Ranges

Occupational Health, Michigan Department of Health, Summer 1962, Vol. 7  
No. 4, Albert E. Heustis, M.D., Commissioner.

In recent years, the use of hand guns has shown a rapid growth as a recreational activity and has resulted in the formation of many local gun clubs. However, the problem which confronts many of these organizations, especially those in metropolitan areas, is where to carry on the activities of the club—where to fire the guns.

The availability of land for the safe use of firearms is at a premium in the large metropolitan and suburban areas of the state and because of this problem, many clubs and commercial organizations are planning or have constructed indoor firing ranges for instructional and sporting purposes.

Police and other governmental organizations have already found that indoor ranges can save considerable time and expense, plus having the advantage of a controlled environment that permits firing under all weather conditions.

Although the indoor ranges offer many advantages, they also present a health hazard. These hazards associated with the use of firearms in indoor ranges have been well documented in the literature, and many lead poisoning cases have been reported among police and range personnel traceable to improper range ventilation. A variety of problems are encountered in the design of indoor firing ranges and in the following paragraphs an outline of the major considerations is presented.

The environmental hazard related to the use of firearms is generally one of lead dust along with carbon monoxide and sulfur combustion products from the burning powder. Oxides of nitrogen are also present to varying degrees and present a hazard similar to that caused by arc welding.

The combination of the above contaminants, together with water vapor, unburned powder, bullet lubricants and miscellaneous combustion products forms the characteristic smoke which has been greatly popularized on TV westerns. The primary source of lead dust is from the vaporization and fragmentation of the lead as it passes through the barrel of the weapon. Revolvers create a special problem in this respect as exact alignment of the cylinder and



barrel is seldom achieved, resulting in the bullet being literally wedged into the barrel at the moment of firing, with the escape of lead dust and expanding gases at right angles to the direction of fire. The effects of this action, known as side blast, can be observed in photographs.

In addition to dust and gaseous contaminants, noise from firearms can be a severe problem particularly inside an enclosed room. The major noise is generated at the moment the bullet leaves the barrel and the rapidly expanding gases used for propulsion strike the surrounding air. At this moment both the gases and the projectile are traveling at from two to four times the speed of sound, and the familiar sharp report is created as the sound barrier is broken. A secondary noise is generated when the projectile strikes the target or bullet trap. All of this noise must therefore be dissipated within the range enclosure and presents an acoustic problem in the overall design.

The typical indoor firing range is designed for gun-to-target distances of from 25 to 100 feet, with widths 20 feet or wider, depending on building limitations. To effectively control the lead dust and gaseous combustion products, a minimum ventilation rate of 50 cfm persquare foot of open cross sectional area at the firing line is satisfactory. The minimum acceptable rate is 20 cfm.

Where length-to-width ratios are less than one, it is recommended that a full partition wall be added extending from the firing line to the targets to facilitate ventilation control, and as an added measure of safety. It is recommended that all air be exhausted from the target or bullet trap area and that tempered make-up air be supplied to the rear of the firing point at a rate equal to the flow of exhausted air.

Care must be taken in the design of the make-up air system to insure good air distribution across the entire firing line, using relatively low discharge velocities. From tests on many of these systems, a discharge velocity of 400 feet per minute or less is necessary to prevent excessive turbulence at the firing line. Very good results can be achieved through the use of a distribution slot which extends across the entire width of the room.

Many people have asked about the problem of clearance time with a ventilation system of this type. From our experience, a room clearance time of five minutes or less is entirely satisfactory for visibility purposes and does not cause any difficulty even under rapid fire conditions. The use of a system which provides air flow across the width of the range is not recommended. Proper baffle design at the firing point is also important in achieving uniform air flow, and in addition, is an integral part of acoustic and side blast control.

A routine range maintenance program is essential if appearance and contaminant control standards are to be maintained. Items such as accessibility of duct work, fans, and other equipment should be made a part of the overall design. For dust removal from walls, floor and bullet trap, we recommend the use of a portable vacuum cleaner. Further cleaning may be accomplished as necessary, using the wet mop technique. Dry sweeping, even with the use of dust suppressing compounds, is not recommended because of the toxic nature of the lead-laden dust. All cleaning operations should be performed



with the ventilation system in operation, beginning at the firing line and progressing down range. To facilitate the cleaning operation, it is suggested that the floors be sloped toward the target area and floor drains and water connections be provided.

Maintenance of the bullet trap can be extremely hazardous because of the high lead dust concentration. For cleaning and repair of this equipment, we recommend that a respirator, approved by the U. S. Bureau of Mines for lead dusts, be worn by the operator. Good personal hygiene should be practiced by all persons using or maintaining firing ranges to minimize the potential of lead ingestion. To assist in this matter, it is suggested that washing facilities be located adjacent to the range with overall convenience in mind.

The use of acoustical material on all flat surfaces is desirable for the reduction of noise exposure to both range participants and observers. Acoustical materials vary by manufacturer and it is recommended that material selected be of a high attenuation rating.

To further reduce the noise exposure to participants, ear plugs, or ear muffs are recommended. Ear muffs of good quality are much favored due to their comfort and effectiveness. Ear protection devices such as plugs, muffs, or a combination of both serve an additional function by enabling the shooter to concentrate on sight alignment. In most cases, higher scores are attained by shooters after ear protection equipment has been applied.

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#### Plastics May Be Hazardous

National Institutes of Health-Plant Safety Branch-News, October 1962,  
U. S. Department of Health, Education, and Welfare, Public Health Service.

In a refrigerated scintillation counter, enough solvent vapor may penetrate through plastic bottles or leak from plastic snap type caps to form an explosive concentration in the box. Fortunately with toluene, the flash point ( $4^{\circ}\text{C}$ ) is higher than the operating temperature (slightly above  $0^{\circ}\text{C}$  to prevent freezing of aqueous solutions) so that a spark from the microswitches or motors will not initiate a detonation.

Many organic liquids penetrate through polyethylene bottles. These include aldehydes, ketones, esters, higher alcohols, benzene, toluene, oils, silicone fluids, and chlorinated hydrocarbons. Your nose is a helpful device in determining if a particular chemical will penetrate through plastic.

Temporary storage of the above types of compounds in polyethylene bottles (such as toluene liquid scintillation counting samples) can result in the development of an explosion concentration of organic vapors in a confined space. A large number of tritium cocktail mixtures kept for a lengthy period in an enclosed area, may create an excessive radioactive level.

At the G. E. Research Laboratory, the bottoms of two polyethylene beakers disintegrated with a sudden noise into jagged pieces as liquid nitrogen



was being poured into them. This accident was unexpected because thin walled plastics ordinarily can withstand this shock.

When pouring extremely cold liquids, use at least as much caution as when pouring very hot materials. Extreme cold makes most plastics as brittle and fragile as glass. Choose containers which will withstand rapid heat changes and fill them slowly (being wary of possible substandard quality) to minimize thermal shock.

Occasionally a tubing system leaks, sprays or comes apart at the joints because the assembler fails to consider the limitation to the otherwise very useful molded nylon connector—it softens in contact with mineral acids.

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Hazards to Health Associated  
with the Use of Epoxy Resins

Carl U. Dernehl, M.D., Assistant Medical Director, Union Carbide Corporation, 270 Park Avenue, New York 17, New York. *Journal of Occupational Medicine* 5(1):17-21, January 1963.

The Epoxy Resins were first made in the late 1930's. Since their first introduction they have become useful materials in a wide variety of applications, and new uses are constantly being developed. Not only are there new uses for old, well-known products, but entirely new series of epoxy compounds are coming into being with extensive research on their effective application.

The epoxy resins are extremely versatile. They form resins which are quite inert and resistant to solvent and corrosive action of many materials. They are resistant to change in dimension when formed in molds or when subsequently heated. They are tough resins with good abrasion resistance. By proper formulation, a degree of flexibility may be incorporated into them. The resin systems accept loading or filling with inert materials to produce new characteristics not inherent in the original resin. The setting time may vary from minutes to several hours. And, finally, the resins have good adhesive properties capable of making strong bonds with many materials, including glass, ceramics, and metals.

From the beginning, the epoxy resins have been responsible for occupational dermatoses which in some cases have discouraged their continued use. A realization of the potential for harm, and application of appropriate precautionary measures, however, make possible continued use of the resins.

### Chemistry

The most commonly used epoxy system is based upon the reaction product of epichlorhydrin and bisphenol A. When reacted these materials form a complex known as the diglycidyl ether of bisphenol A. Through various means of manufacture it is possible to make basic resins of various molecular weights. The basic resin elements have two epoxy groups which are available for crosslinking

by one or by a mixture of several processes. The nature of all possible polymerization reactions is too complex to record here, but they generally fall into two large classes. In one of these, polymerization is initiated by a reaction which opens the epoxy radical and causes one epoxy molecule to react with a neighboring molecule. In the other, the reaction is initiated by amines or other materials which act as cross-linking agents, binding the resin molecules together and becoming an intimate part of the polymer molecule. At present, amine crosslinking hardeners or curing agents are the most widely used in epoxy resin systems.

In general, the epoxy systems are prepared at the time of use because once "cure" has been initiated it progresses to completion. Depending upon the resin and hardener selected, the potlife between mixing of hardener and resin and final cure may vary from minutes to many hours. Some systems reach complete cure at room temperature and some require heating to complete the reaction. Most systems are exothermic; that is, the chemical reaction generates its own heat. Those systems which cure in minutes are most exothermic as a rule. The fact that the ingredients of the epoxy systems must be mixed immediately prior to use leads to good opportunity for employee exposure. Usually, the ingredients are prepared in and used from a disposable container so that no container loss occurs if the resin sets, and no cleaning of a container is required. The ingredients are individually measured out or weighed. When amine hardeners are so handled, there is opportunity for exposure to liquid and vapors. Likewise, when the ingredients are mixed, exposure to material still containing unreacted amines is possible—particularly when one considers that the raised temperature from the exothermic reaction increases the vapor pressure of the unreacted amines. During the pouring or spreading of the epoxy, yet another opportunity exists for contact with unreacted material. Weighing and mixing ingredients in a ventilated hood and application of the resin in well-ventilated areas is necessary to hold vapor exposure at a minimum. Appropriate care must be exercised to avoid direct contact with the epoxy during weighing, mixing, and application.

### Toxicity

Early work with epoxy resins systems suggested that the diglycidyl ether of bisphenol A was not a matter of much concern as a toxic hazard. This conclusion was based upon routine animal studies which gave the resin a very low toxicity rating. As use of the resin became widespread, reports began to appear of unusual skin reactions among workers. These reports consistently referred to the skin-irritating properties of the resin as distinct from that of the hardener and prompted evaluation of the resin on the skin of human volunteers by the means of repeated insult patch tests. In this test a patch is applied every 2 days to the same skin area for a total of 12 applications. After a 2-week incubation period a challenge test is applied. By this test it was found that the particular resin under study was so allergenic to humans that the series of 12 patches could not be completed. However, not all resins are sensitizers and, in particular, the diglycidyl ether-bisphenol A complexes in



molecular weights greater than 200 are not considered "strong sensitizers" under the criteria of the Federal Hazardous Substances Labeling Act.

Certain of the resins have less ability to sensitize because of a preliminary polymerization which carries the reaction part way and results in a very viscous liquid or, in some cases, a solid product. Such prior-reacted resins have specific properties and uses, but these may be quite different from those of the unreacted resin. It is common practice to reduce the viscosity of some of these resins by the use of reactive diluents, such as butyl glycidyl ether, which may have toxic properties of their own. The solid resins may be put into solution in an inactive solvent, in which case the toxicity or other hazard of the solvent becomes an additional matter of concern. While the sensitizing action of some base resins has created a problem, it is overshadowed by the effects of the amine hardeners.

Most of the amine hardeners have an unsavory reputation as sensitizing agents. While they are inherently more toxic than the resins, they still are not classed as highly toxic materials. The aliphatic polyamines, of which ethylene diamine, diethylene triamine, and triethylene tetramine are familiar examples, are strongly alkaline materials and are capable of causing extensive corrosive damage of living tissues. Severe burns may be caused by prolonged contact with the skin, and eyes may be seriously injured by small droplets of the liquid chemical. Most amine hardeners have somewhat similar actions, but generally less severe than the polyamines cited. Some of the aromatic amines are weak sensitizers, but have distinct primary irritative action.

The most distressing effect of contact with the aliphatic polyamine hardeners is the induction of a state of allergy. Experience has shown that both the vapors and the liquid are capable of inducing sensitivity in some persons. Once a person has become sensitized, exposure to even minute quantities of vapors is sufficient to cause a reaction in the affected individual. Efforts have been made to try to reduce the sensitizing potential of some polyamines by substitution on the amine radical. In tests on human volunteers, diethylene triamine sensitized 50% of the group, whereas one of the substituted compounds, bishydroxyethyl diethylene triamine, was essentially nonsensitizing. Unfortunately, the characteristics of the cured resins may vary with different hardeners and it is not always possible to use the modified curing agents.

The cured resin is believed by many to be physiologically inert. Cured resins tested on the skin of volunteers produced no reactions. Some of these materials have been used in surgical procedures and have proved to be durable and nonirritating. However, one word of warning about use of the cured resin is in order. Castings made from the resins are not always perfect and may in some cases require some finishing. There is some evidence that when these resins are sawed, drilled, machined, or otherwise subjected to procedures which generate high degrees of local heat, degradation products may be formed which may be harmful. Some observers believe these may contain free amines. Others have observed harmful effects, but have not been able to identify the noxious agent. When these resins must be mechanically worked, it would be wise to do so in areas where local exhaust ventilation can remove toxic products.



## Medical Observations

Reactions to the use of epoxies in industry have varied from few complaints to serious difficulties, depending upon variables such as type of application, resin system employed, housekeeping in the shop, and personal hygiene of the worker. At best, no trouble has occurred, and at worst, as many as half or more of a work force developed dermatitis. Generally, the polyamine hardeners have been implicated as the major source of difficulty.

The sensitizing potential of these amine hardeners was predictable from experience at the manufacturing unit. In general, this was an enclosed process although there were certain places where leaks or faulty design of equipment permitted the escape of vapors to the air. Also, if chemical operators were careless in their work, there was a possibility of contaminating skin and clothing. Skin deposits were generally washed off rather quickly because of the ability of the amines to cause burns. Contaminated clothing, however, was frequently worn for an entire workday. During the initial operating phases, as many as 50% of operating personnel developed some form of trouble and had to be removed from further contact.

There was considerable variance in response among individuals. Some few persons developed a rash within the first few days in the unit. Probably the most sensitive person was the wife of one chemical operator who became sensitized while handling her husband's work clothes prior to laundering. The majority of those reacting had mild difficulties after a few weeks or months and then severe problems necessitating removal from the unit a year or more after the initial onset. There are a very few individuals who have now worked 12 years with the ethylene amines and have had either no trouble or, at worst, only transient skin problems. It is of interest that the problem could be controlled, as is shown by the fact that skin trouble in this unit operation is now unusual. It is probable that this is in part due to natural selection, in that reactors were moved out of the unit and in time a resistant work force remained. However, the big improvement occurred when engineering improvements sharply reduced the amount of escaping vapor and when an educational program among employees improved their work habits and personal hygiene. The prompt removal of skin deposits was emphasized. The need to avoid contaminated clothing was pointed out. Workers were encouraged to wear a clean set of clothing each work day. They were instructed to use proper protective clothing when contact with liquid or vapors seemed unavoidable. Any skin abnormality was to be reported immediately so that appropriate care could be instituted. Under such a program it has been possible to operate with a minimum of human discomfort and illness. In a large measure, these same precautions apply to the use of these hardeners in epoxy resin systems.

The manifestations of sensitivity have varied widely. Probably the most mild was a redness, swelling, and scaling of the tender skin about the eyes, nose, and cheeks. This reaction was believed due to vapor exposure and was initially felt to be a primary irritant action. Removal from further exposure resulted in gradual clearing of the lesion. The allergic nature of the skin rash was clearly shown in most cases by immediate flare-up after sometimes less



than an 8 hour exposure to an environment containing only traces of amine vapors.

More severe reactions usually involved the hands, wrists, and arms, areas commonly contaminated by the liquid chemical during work. Frequently such severe responses would also appear beneath areas of contaminated clothing, particularly on the lower legs and ankles which were common areas of contamination from chemical splashes. The lesion first appeared as a red swollen itchy area which quickly progressed to a vesiculated weeping skin rash. Extension of the area of involvement often occurred for the first few days. Early in our experience attempts were made to treat the skin rash during continued employment. Duration of treatment was prolonged and it soon became clear that these rashes could not be healed as long as exposure to the noxious agent was possible. It became routine practice to remove all employees with cases of skin rash from further exposure as soon as the lesion came to our attention. This generally shortened the illness, but prolonged periods of disability still occurred in some cases. Attempts to return the individual to his job after healing of the skin generally resulted in a prompt recurrence of the rash, usually in the same location and generally more severe in nature and more resistant to treatment. In one case a sensitized individual was returned to his old job successfully after a lapse of two and one-half years.

The second most common toxic response observed among those exposed to aliphatic polyamines was bronchial asthma. In an 8-year period of observation, 15 new cases of asthma occurred among those exposed to the amines. The asthmatic attacks appeared whenever exposure to amines occurred. The attacks were severe and required typical asthmatic therapy to bring resolution. Removal from contact with amines stopped further attacks, except that a few workers would have asthma after exposure to high concentrations of a nonamine irritant chemical which in itself did not cause asthma in other workers. Accidental exposure of several cases to environments which might have contained amine vapors, but below the threshold of odor, resulted in a severe attack of asthma within 20 minutes, even though these cases had been away from amines and free of attacks for 2-4 years. It is of interest that there have been few reports of respiratory troubles in the use of amine curing agents in epoxy systems.

From the start of production in 1947 to the present date, the personnel of the polyamines unit, as well as maintenance and shipping workers, have received periodic health examinations on at least three separate occasions and frequently on an annual basis. These consisted of a searching history, a complete physical examination, and laboratory work consisting of urinalysis, complete blood count, chest x-ray, electrocardiogram, and blood chemistry as indicated by the findings. None of these employees has shown any findings different from those noted in the rest of the work force of about 2600 persons. There has been no unusual prevalence of illnesses except those related to sensitization, which appear only when amines exposures occur. Those persons who have demonstrated sensitization have no evidence of residual effects when removed from further exposure to polyamines.

It will not be possible to discuss all of the various amine hardeners. In general, practically all have some potential as a sensitizer or irritant. When carelessly handled, the substituted amine hardeners or other inherently less allergenic compounds will cause trouble, but this will be less often or may take a little longer before becoming manifest.

Mention should be made of the organic acid anhydrides which are used to cure some epoxy systems. In these systems some organic acids may be formed and these have primary irritant properties as do the anhydrides. Some of the more complex materials may have sensitizing properties, but this is less common in this group of hardeners.

### Precautions in Use

If one uses proper precautions, epoxies may be used safely and full advantage may be taken of their unique properties. Carelessly used, they will almost certainly cause trouble. Certain basic rules of operation must be followed. Some of these are:

1. Weighing, measuring, mixing, and storing of resin prior to use should be done in a ventilated hood to reduce or avoid vapor exposure.
2. Avoid skin contact with vapor and liquid ingredients; use gloves, armlets, and aprons as protective devices. Barrier creams with a high silicone content may help, but are no substitute for avoidance of contact.
3. Personal hygiene must be scrupulous; immediate removal of epoxy deposits by soap and water scrubbing is urged.
4. Good housekeeping in the work area reduces the probability of accidental contact and keeps air concentrations of vapors low. A waste can with a close-fitting lid should be available for disposal of contaminated materials. Work should be done on disposable sheets of paper so that a clean work surface is always available. Used containers should be discarded at once rather than permitted to lie on work tables and contribute to air contamination.
5. Work should be done in a well-ventilated area to reduce contact with vapors to a minimum.

A very few persons will be inordinately sensitive and will respond adversely to traces of material. These should be quickly removed from the work force. The great majority of workers, if they develop a sensitivity at all, will do so after exposure for many weeks or months. If exposures remain small and deposits are quickly removed, no trouble may ever appear. Development of sensitivity seems based on the size of the dose and the time it is permitted to act. If both are kept low, trouble can probably be avoided. If either is permitted at a high level, trouble can be predicted with a high degree of assurance.

### Summary

The potential of epoxy resin systems cured with polyamine hardeners for causing dermatitis has been pointed out. The dominant role of the polyamines as the etiologic agent has been related to experience at an amines manufacturing unit. Precautionary measures have been described which reduce the probability that skin troubles will occur.



**RESERVE****SECTION****Uniform Allowances**

(1) **General.** Section 305 of the Career Compensation Act of 1949 (37 U. S. C. 255), as amended, provides uniform allowances for Reserve officers who meet certain qualification requirements. Three specific types of uniform allowances are prescribed to which officers of the Naval Reserve may become entitled: an Initial Uniform Allowance not to exceed \$200; an Additional Active Duty Uniform Allowance not to exceed \$100; and, a Uniform Maintenance Allowance not to exceed \$50. The necessary service requirements which must be met to become entitled to any of these allowances are outlined specifically for each type of allowance in the succeeding paragraphs.

(a) **Time Limit for Filing Claims.**—Title 31, United States Code, Section 71a provides that every claim against the United States shall forever be barred unless such claim shall be received in the General Accounting Office within ten full years after the date such claim first accrued. Officers of the Naval Reserve should submit claims immediately after the right to the payment accrues to avoid the possibility of nonpayment. Title 34, United States Code, Section 771, which established a three-year statute of limitations for the filing of claims for uniform allowance, was repealed on 12 July 1955. This repeal does not permit payment nor affect the status of uniform allowance claims barred by that Act prior to the date of repeal.

(b) **Adjudicating Authority.**—Authority to adjudicate and effect payment of initial uniform allowance claims for Naval Reserve Officers attending or appointed in classes at U. S. Naval Schools Command, U. S. Naval Station, Newport, Rhode Island, is hereby delegated to the commanding officer of that command. Authority to adjudicate and effect payment of initial uniform allowance claims for newly commissioned officers of the Navy Nurse Corps Reserve, with no prior military service, reporting to the Navy Nurse Indoctrination Center, Naval Hospital, St. Albans, Long Island, New York, is hereby delegated to the commanding officer of that command. Authority to adjudicate initial uniform allowance claims for other Naval Reserve officers and uniform maintenance allowance claims is hereby delegated to the Officer in Charge, U. S. Naval Reserve Officer Recording Activity, U. S. Naval Personnel Center, Omaha, Nebraska. The additional active duty uniform allowance will be adjudicated and paid in accordance with the instructions contained in the Navy Comptroller Manual, Paragraphs 044145 and 044146.

(2) **Initial Uniform Allowance.** Upon appointment in the Naval Reserve, an officer is entitled to an initial sum not to exceed \$200 as reimbursement for the purchase of required uniforms and equipment. Eligibility to receive



this initial sum accrues on the date any one of the three conditions specified in subparagraph (a) is met. Periods of active duty, active duty for training, or inactive duty training may be counted as duty for the purpose of entitlement only if such duty required the wearing of the uniform. For the purpose of determining entitlement based on inactive duty training, regular drills, equivalent drills, periods of appropriate duty and special inactive duty training may be counted. Eligibility of an officer is determined as follows:

(a) Eligibility.—Naval Reserve officers become entitled, incident to such appointment, to an initial uniform allowance not to exceed the amounts indicated in the table in paragraph 044145 of the Navy Comptroller Manual, either:

1. Upon the first reporting for active duty as an officer of the Naval Reserve for a period in excess of 90 days on or after 1 January 1953, provided such officer has not heretofore received an initial uniform allowance or uniform gratuity allowance in any amount as an officer under any other prior provision of law; and, provided further, if applicable to the officer concerned, two years have elapsed since separation from active duty as an officer of a Regular Component of the Armed Forces; or

2. Upon the first completion of not less than 14 days active duty on or after 1 January 1953 as an officer in the Naval Reserve, or active duty for training, provided such officer has not heretofore received an initial uniform allowance or uniform gratuity allowance in any amount as an officer under any other prior provisions of law; and, provided further, if applicable to the officer concerned, two years have elapsed since separation from active duty as an officer of a Regular Component of the Armed Forces; or

3. Upon the first completion of 14 periods of not less than two hours duration each, of inactive duty training after 1 January 1953, as an officer of the Ready Reserve of the Naval Reserve; provided such officer has not heretofore received an initial uniform allowance or uniform gratuity allowance in any amount as an officer under any other prior provision of law; and, provided further, if applicable to the officer concerned, two years have elapsed since separation from active duty as an officer of a Regular Component of the Armed Forces.

(b) Qualification for Entitlement Under Special Circumstances.—The preceding provision in sub-paragraphs (a) 1, 2 and 3 which requires that at least two years elapse after separation from active duty as an officer of a Regular Component of the Armed Forces would not bar entitlement under (a) above if a member's duty extended for more than 90 days after the end of the two years limitation notwithstanding that a portion of the duty under the same tour commenced within two years of separation from the regular component.

(to be continued)



Constellation Coin Serves  
As "Lifetime Pass" to Ship

The Constellation, the nation's oldest warship still afloat—she was launched and went to sea a few weeks ahead of the Constitution—is now homeported in Baltimore, where she was built in 1797.

The famed ship is being restored as a Navy memorial. To help obtain the \$250,000 needed to complete the project, a number of commemorative coins—made in part from copper removed from the hull during restoration—are on sale for \$1 each. The coins serve a second purpose—that of a lifetime pass for the holder to visit Constellation.

Coins may be obtained singly, or made up on lots of 25 mounted on a display card; the address: Constellation, Baltimore 2, Md.

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